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SCIENTIFIC RESEARCH, FOREST ASSESSMENT AND DEVELOPMENT OF CRITERIA AND INDICATORS FOR SUSTAINABLE FOREST MANAGEMENT

Programme element III.1 (b): Measuring and capturing forest values: issues, policies and challenges

Report of the Secretary-General

SUMMARY

The present report is prepared in response to the request of the Ad Hoc Intergovernmental Panel on Forests at its second session to have additional input on some of the underlying policy issues that influence forest valuation (programme element III.1 (b)), scheduled for further substantive discussion during the third session of the Panel.

Forests are often adversely affected by the behaviour of two groups belonging to the two extremes of the socio-economic scale: rent-seeking concessionaires, and poor farmers who are forced to practise "slash and burn" agriculture. The issue of values of the multiple benefits of the forests has two dimensions: first, the various values have to be identified and measured, and, second, means have to be created to capture these values, thereby leading to improved forest management based on a fuller understanding of benefits and costs. Examples from Indonesia and Costa Rica show that if all values of the forests are accounted for, sustainable forest management is economically justified.

This report discusses the reasons for observed destructive practices and different means to reduce them. Concessionaires would have an incentive to

use the forest resource more efficiently and according to sustainable principles if the price of the resource and costs of non-compliance with sustainable guidelines were increased, and the terms of concessions permitted them to be marketable assets, which the owner would then have an incentive to protect and maintain. Similarly, poor farmers and forest dwellers would be more inclined towards sustainable behaviour if they were given the chance to participate in management decisions, and shared the revenues and user rights, especially of non-timber products.

Although the last 30 years have seen a major increase in the use of economic analysis to understand and measure the values associated with forest benefits, there is scope for considerable further development. In practice, it is seldom that all benefits are fully measured and minimum values are often used. An example from Croatia illustrates how important non-marketable values like "visible landscape" and "erosion protection" can be, when the traditional value of the wood production is small in comparison.

There are large uncertainties involved when trying to value biodiversity. Although the potential value could be very high under certain circumstances, biodiversity will only have a real value if somebody is willing and capable of paying for it. For this reason, there will be insufficient protection of biodiversity if normal market forces rule. Increased international transfers will be needed to protect threatened biodiversity, and it is essential that such transfers be properly monitored.

Direct benefits of carbon sequestration at the national level are small when compared with the real costs of protecting a "carbon sink". Poor countries with large sinks cannot be expected to provide "sequestration services" on their own. Here also substantial transfers are needed.

Certification of forest management and forest products has great potential as a tool for controlling sustainable management of forest resources, but there are many pitfalls. Consumer countries will have to take concerted action, and be prepared to pay the additional costs involved. It is also important to introduce similar schemes for substitutes for wood.

Undervaluing of the multiple benefits of forests is one of the factors that have led to reduced investments in forestry. This, coupled with widespread forest destruction, accounts for the fact that the future of the world's forest resources currently looks gloomy. Significant progress will only take place when nations with large forest resources recognize that it is in their own interest to use those resources sustainably.

CONTENTS

	Paragraphs	Page
INTRODUCTION	1 - 5	4
I. VALUING FOREST OUTPUTS	6 - 38	5
A. National level	16 - 31	7
1. Pricing forest outputs	16 - 25	7
2. Participation and forest values	26 - 31	14
B. Global level	32 - 38	15
1. Value of biodiversity	32 - 35	15
2. Value of carbon sequestration in the context of climate change	36 - 38	16
II. VALUING SUSTAINABILITY	39 - 44	18
A. Certification of forest management and forest products	41	18
B. Natural resource accounts	42 - 44	18
III. CONCLUSIONS AND PROPOSALS FOR ACTION	45 - 55	19
A. National level	51 - 53	20
B. Global level	54 - 55	22
Annex. RECENT WORK ON VALUING FOREST BENEFITS		24

Boxes

I.	Indonesia: is sustainable forestry economic?	9
II.	Costa Rica: can sustainable forestry compete with other land uses?	11
III.	Croatia: the value of reforestation	12

INTRODUCTION

1. The present report covers implementation of the decisions of the United Nations Conference on Environment and Development (Rio, 1992) related to the first programme element of category III, "Scientific research, forest assessment and development of criteria and indicators for sustainable forest management", of the programme of work of the Ad Hoc Intergovernmental Panel on Forests.

2. The work under this programme element (III.1) is guided by the decisions taken at the third session of the Commission on Sustainable Development and further elaborated at the first and second sessions of the Ad Hoc Intergovernmental Panel on Forests. The Commission defined programme element III.1 as encompassing the need to "review existing periodic assessment of forests, including relevant socio-economic and environmental factors, at the global level; identify shortfalls in present assessments relative to policy considerations; and recommend practical ways of improving such assessments. Examine ways to broaden the scientific knowledge and the statistical database available in order to better understand the ecological, economic, cultural and social functions performed by all types of forests. Promote the further development of methodologies for properly valuing the multiple benefits derived from forests in the form of goods and services, and subsequently to consider their inclusion within the system of national accounting, drawing upon work that has been already undertaken by the United Nations and other relevant organizations". 1/

3. Subsequently, the Panel, at its first session, emphasized the need for the preparation of two reports: (a) one covering programme element III.1 (a), "Assessment of the multiple benefits of all types of forests" and (b) (the present report) covering programme element III.1 (b), "Methodologies for proper valuation of the multiple benefits of forests", which "would consider ways to promote the further development of methodologies for properly valuating the multiple benefits derived from forests, in the form of goods and services, and subsequently consider their inclusion within the systems of national accounts, drawing upon work that has already been undertaken by the United Nations and other relevant organizations and assessing progress in the application and incorporation of innovative approaches into national accounts" (see E/CN.17/IPF/1995/3, sect. II, para. 18).

4. At the second session of the Panel, members of the Panel expressed an interest in having more input on some of the underlying policy issues that influence forest valuation. This report is a response to that interest. It has been prepared by staff of the World Bank, as the lead agency for programme element III.1 (b), in consultation with the secretariat of the Ad Hoc Intergovernmental Panel on Forests in the Division for Sustainable Development of the Department for Policy Coordination and Sustainable Development of the United Nations Secretariat. In addition, comments and contributions were received from the Food and Agriculture Organization of the United Nations (FAO), the Centre for International Forestry Research (CIFOR) and individual specialists.

5. The report takes into consideration paragraphs 11 and 15 of the Statement on biodiversity and forests from the Convention on Biological Diversity to the Ad Hoc Intergovernmental Panel on Forests of the Commission on Sustainable Development (E/CN.17/IPF/1996/9 and Corr.1, annex).

I. VALUING FOREST OUTPUTS

6. The forestry sector is widely viewed as a difficult sector with frequent poor outcomes of both investments and interventions. Especially in those developing countries where forestry plays a major part in the economy (which usually implies that a country has a major endowment of natural forest), the forest resource may be subject to political patronage and special dealing. Forest resources occur naturally and are often located in areas that can be difficult to manage and supervise. Consequently, forests are commonly the object of "rent-seeking behaviour" - that is, extraction of resources in a non-sustainable manner with excess profits going to selected, often politically favoured, individuals.

7. Forests are also often adversely affected by the behaviour of groups at the other extreme of the socio-economic scale - poor farmers and other inhabitants of areas in or near forests. In this case, the situation very often is one where such groups are offered little or no access to the benefits of forest protection and production. Therefore, they see their main interests as being served by the conversion of forested land to other uses, even if that use is neither sustainable nor in the best economic or environmental interests of the nation as a whole.

8. In this sense, although forestry is frequently compared with other land-using sectors such as agriculture (especially when analysing the economics of investments in the sector), it is in fact quite different. In most cases, ownership of the means of production of agriculture is in private hands, fragmented among many small-scale owners. While rent-seeking behaviour and distortions of markets are by no means rare in agriculture, they tend to be secondary to the mainstream business of the sector. In forestry, the very terms and conditions under which use rights are given by the resource owners (usually the State) to its principal users are frequently a major source of rent transfer, and all subsequent decision-making, resource allocations and, ultimately, valuations made in the sector are influenced by this fact.

9. Another important difference between agriculture and forestry is the time-span between investment and return (harvest). While agriculture needs an annual investment to produce a crop, natural forests are often considered an existing resource regarding which the only investment needed is for harvest, and perhaps the payment of a small royalty or stumpage fee. As a result, there are few natural incentives to invest in reforestation, and the temptation is to take the initial quick return from harvest and ignore investments for distant future harvests. These problems are amplified when deforestation is done by small slash-and-burn farmers with high discount rates, short time-horizons and uncertain tenure status.

10. In developed countries, the fact that it is more common for the user to be obliged, either through legislation or contractual arrangements, to reforest after final harvest forces the user to regard the cost of reforestation as part of the cost for utilizing the timber. This situation gives a better ground for proper valuation of the forest's timber value, although other forest functions, like carbon dioxide (CO_2) fixation and maintenance of biodiversity, are often undervalued.

11. A major development over the past 30 years has been the increased use of economic analysis to understand and measure the values associated with a wide range of forest benefits. Some of these estimates are for benefits that were formerly considered quite intangible and not amenable to measurement. For example, economists now routinely measure the benefits (consumers' surplus) enjoyed by visitors to protected areas and other recreational sites. One can also measure the willingness-to-pay of individuals and groups for protection of unique habitats, or endangered species. These studies are yielding concrete estimates that can be used not only to determine the total social benefit received by users of selected protected areas, but also to devise taxation systems to "capture" part of the benefit to be used to help defray costs and improve management. In many situations, the distribution of benefits and costs, especially when poor or marginal populations are involved, is an equally important dimension.

12. For some categories of goods and services, the techniques used and the results obtained are quite robust. For other areas, there are major data and analytical problems. Still, the remaining problems should not distract from the real advances that have taken place and the fact that the benefits estimated are frequently minimum values, since many important benefits may not be amenable to estimation and thus may not be included. The methods available for valuation have been summarized in the earlier report prepared for the Panel on methodologies for proper valuation of the multiple benefits of forests (E/CN.17/IPF/1996/7), and in a number of standard references cited in the annex to this report.

13. It is important to bear the realities in mind when embarking upon a consideration of the implications of valuation methodologies in forestry. Three questions are important, namely, what should be valued, from whose perspective, and how these values can be measured and captured. In other words, asking the right question is at least as important as determining the best means by which questions should be answered. It is at least arguable that the reason why incorrect and seemingly perverse resource allocation, management or land conversion decisions are made in forestry is not that those involved in the decision-making process are unaware of the correct valuation techniques or incapable of applying them, but rather that vested interests operating in the sector are simply unwilling to consider the alternatives such analysis might put forward. These special interests may be large timber operations or small subsistence agriculturists. It is for this reason that the present report focuses primarily not upon the relative merits of the various technologies of valuation, but upon the policy and institutional issues that need to be considered when those techniques are applied. This implies strong links with the formulation and implementation of national forest programmes (NFPs) and programmes of related sectors (regarding, for example, the valuation of water),

and also involves dealing with the underlying causes of deforestation, as discussed under programme elements I.1 and I.2 of the programme of work of the Panel.

14. As noted above, rent-seeking behaviour by powerful interests associated with the industrial logging and processing sector, and the exclusion of other interest groups from effective participation in forest management, lead to the ignoring of many forest values - values that are often significant, including non-timber forest products, biodiversity benefits, on-site and off-site soil and water impacts, and carbon sequestration. Failure to take these factors into account results in an underestimation of the value of the resource, and therefore in incorrect decisions as to its use and management. Undervaluation of the resource, and consequently incorrect decisions as to its use, also result from a lack or failure of mechanisms to adequately capture the benefits that are potentially available. This leads to a situation where those benefits are assigned a de facto zero or very low value by decision makers, since they are not actually accruing to any group. Therefore, this report will deal with the issues surrounding both the measurement of forest values, and the capture of those benefits. 2/

15. The management challenge is to correctly analyse these various benefits from forests, while recognizing that many important benefits will occur at the national, regional or international level and may not have readily observable market prices. Because of these factors and other market failures, together with the existence of widespread policy failures, forest resources are often used in a manner that is uneconomic from a social perspective (although very profitable from a private financial perspective). The result is an unsustainable management pattern.

A. National level

1. Pricing forest outputs

16. In cases where forest depletion is observed, it is usually not true that those responsible are acting in an inefficient or wasteful manner. Indeed, in most cases they can be shown to be operating quite efficiently in a commercial sense, based upon the market and price signals they are receiving. To the extent, however, that those signals are wrong (in that they are not reflecting the real value of the resources involved, and the degree of scarcity that is implicit in their continued supply), the users will be inefficient and wasteful from a public and societal point of view. If the market and price signals change - should, for example, a Government raise the resource price of logs considerably (either administratively, or by introducing a greater degree of competition among the potential buyers of those logs) - then processors and other users will alter their methods of production, substituting other inputs for the erstwhile cheap, but now more expensive, resource. There will usually be short-term adjustment costs associated with this, but these are rarely as significant as those predicted by users before the change has occurred.

17. There are some experiences in other sectors illustrating that early evaluations of investments in environmental protection, like reduction of air

and water pollution, tended to underestimate the real values of all the benefits and overestimate the cost of achieving them. In the late 1960s, stricter control of effluents from the pulp and paper industry and other major polluters in Sweden restored the waters around Stockholm to the extent that bathing is now possible in the middle of the city and fishing for salmon has become a major attraction. Besides obvious benefits for the local population, the improvement has also had very important indirect economic implications through increased tourism.

18. Effluent restrictions also promoted research in the pulp and paper industry that led to techniques for recovering chemicals from the digesting liquor and generating heat, and subsequently electricity, from the burning of the residues. Such techniques are now considered economic and cost-efficient production processes in their own right. State-of-the-art pulp mills now release water that is cleaner than the water they take in and are almost self-sufficient in terms of energy supply. Research has extended so far that today it is possible to build a pulp and paper mill with a closed system without any effluent. It will probably take another 10-20 years, however, before such mills are operating on a commercial scale.

19. Similar lessons have also been learned in other areas, such as air pollution control. It has been found that often there are investments yielding important environmental benefits that may also produce direct economic returns to the firm implementing them. Distorted input prices in many of the former Soviet countries led to inefficient use of energy and raw materials, high levels of pollution, and poor-quality outputs. Adjusting prices by removing subsidies has resulted in efficiency gains and reduced environmental damage. Similarly, low or non-existent stumpage fees discouraged better forest management.

20. A parallel lesson can be drawn for the forest sector. The analyst seeking answers on the true worth of forest resources will learn relatively little from the production costs and technical coefficients of an industry that is based on an input (forest products) that is underpriced. If the new materials derived from the forest are priced correctly, one will observe major changes in production processes and efficiency of input use. An example that demonstrates this argument can be drawn from some recent World Bank analysis of the economics of forest sustainability in Indonesia (see box I).

21. Similar reasoning applies in the case where logs are being directly exported, either at stumpage prices that are too low, or where the method of assessing stumpage does not create any incentive for efficient log extraction from the forest. In such cases, the perceived value of the standing resource, and thus the benefits of ensuring its regeneration, will be lower than the real value.

Box I. Indonesia: is sustainable forestry economic?

In September 1995, the World Bank presented an analysis of the economics of sustainable forestry in Indonesia to the Minister for Forestry, and senior government and industry officials. A basic premise of the analysis was that, with current patterns and levels of exploitation of the natural forest resources of the country, in a relatively short period - 10-15 years - Indonesia would have little commercially usable forest estate remaining: either the resource would be in an immature regenerating state, following high levels of extraction in the preceding three decades, or it would have been converted from natural forest to some other form of land cover. The alternative scenario was to adjust the annual allowable cut from the forest resource down to sustainable levels, through a mixture of administrative and market measures designed to create strong incentives to pursue sustainable practices among all interest groups involved in the sector. The question was, was this worth doing, from Indonesia's point of view?

To the extent that economic analyses of the desirability of persistence in forestry as compared with agricultural conversion are carried out in Indonesia, they tend to be done on the basis of static, average-hectare comparisons, usually assuming conversion to some investment-intensive, high productivity alternative, and often using unadjusted current prices in the analyses, as opposed to true market prices. Not surprisingly, the result is usually in favour of conversion, unless decision makers can be convinced to accept high valuations for unquantified environmental and other externality benefits in particular cases.

In this study, however, it was assumed that most forest that is converted is likely to end up in fairly low-intensive alternatives, such as shifting cultivation, because this is the reality of forest conversion in Indonesia. It is simply not feasible that any more than 10 or 15 per cent of the currently forested land area of about 100 million hectares (ha) could be converted to high-productivity agricultural or tree crop use, given rational assumptions about site suitability, the availability of investment capital for such purposes, and the likely impacts on commodity markets of large additions to supply. The basic efficiency of investment in regeneration of logged-over forests was shown to be superior to low-intensity agriculture options, even though quite conservative values for non-timber outputs, and soil and water benefits, were applied.

Rather than treat processing norms as exogenous and static across both scenarios, the study assumed that, according to perceived scarcity of the basic raw material, industry would adjust its technology and processing efficiency - not only (more rapidly) in the case of the sustainable scenario, where log availability volumes would decline fairly quickly from current levels (importantly, it was assumed that this signal would be sent to the processing sector very clearly in the form of resource price rises), but also in the case of the non-sustainable scenario, as available log volumes declined as a result of forest depletion towards the end of the period of analysis. All adjustments of technology used in this respect were kept within currently achievable bounds, so as not to bias the analysis.

The basic analytical results indicated that Indonesia would be far better off, in standard economic terms, to move its forest extraction and processing onto a genuinely sustainable basis. This option was shown to have a net present value $6 billion greater than that derived from a projection of a continuation of present usage patterns, at a real discount rate of 11 per cent per annum. It is interesting that this result was achieved without inclusion of any valuation of global benefits from forest retention (biodiversity protection and carbon sequestration), and with relatively conservative assumptions on the rates of technical adjustment that would be made in the sector as a result of altered log volume availability signals. As a result, the study was able to draw strong conclusions on forest resource pricing and allocation, industry and trade policy, revenue sharing and participation, and other fundamental policy constraints that currently encourage non-sustainable practices in the sector, despite the clear preferability of the sustainable option, from the national viewpoint.

22. The World Bank has also studied the economics of sustainable forestry in Costa Rica, where it was evident that most accessible forest could in fact be converted to fairly profitable alternatives, by small- and larger-scale land users. However, the study concluded that, while the interest groups immediately involved would profit from conversion of forests to other land uses, the nation as a whole would lose. The study therefore recommended a system of subsidies that would compensate the group that lost, in direct terms, from the imposition of sustainable forestry practices (see box II).

23. The study also illustrates the limitations of "across the board" solutions even within a relatively small country such as Costa Rica. A general application, including large forest countries, would present an even greater challenge.

24. A further variant of the problems created by inadequate market signalling in forestry is the increasingly recognized one of undervaluation of non-timber forest products. In many countries where forests are allocated for utilization - usually to a large commercial concern - such a user may have either no interest in using, or no right to use, the non-timber products that are in the forest. Others, including traditional local users of the forest, may be excluded from extraction of the resources under the terms of new concession agreements, or may simply be denied access to them by the nature of the large-scale operations being undertaken. Again, in such cases the actual level of output of non-timber forest products from the production forests, and the prices paid for them, will be a poor guide to their potential value in an effectively functioning market situation.

Box II. Costa Rica: can sustainable forestry compete with other land uses?

Sustainable forest management, though thought to be a desirable environmental goal, is seldom practised in Latin America. Forests are threatened by conflicts of interest between those who want to protect the country's natural resources and those who wish to develop the land for strictly commercial purposes. Costa Rica provides a good example of this dilemma. In spite of aggressive policies to promote sustainable management of forests, forest depletion has continued and today most remaining pristine forest areas are contained within the protected area system.

A study attempted to shed some light on the question why sustainable forest management was not being widely adopted and on the nature of the conflicts of interests regarding forest conservation. Specifically the study attempted to answer the following questions:

(a) Is sustainable forestry commercially viable?

(b) Is sustainable forestry economically desirable once the environmental values from forests are considered?

(c) Who gains and who loses from the lack of sustainable forestry?

(d) Who should pay for incentives to promote sustainable forestry?

The analysis was based on real and simulated data for three sites in Costa Rica. It included simple forest growth and land-use models that compared the profitability of sustainable forest management with that of conversion to high-yield forest plantations, forest mining and cattle ranching. Back-of-the-envelope estimates of environmental values, including watershed values, pharmaceutical values, carbon sequestration and existence and option values for biodiversity, were included. The analysis considered four social groups: large farmers integrated into capital markets, small farmers excluded from capital markets, local taxpayers, and international consumers of environmental services. The answers to the above questions were the following:

Sustainable forestry cannot compete with alternative land uses under constant price assumptions, and this is consistent with everyday practices observed in Costa Rica. Large farmers prefer conversion to capital-intensive land uses such as forest plantations, while small farmers adopt forest mining technologies.

Sustainable forestry would be economically desirable if environmental values were considered. Hence, it would make sense to subsidize farmers' practising sustainable forestry. Carbon sequestration and biodiversity values overwhelm national environmental values such as watershed protection.

International consumers of environmental services lose the most from the absence of sustainable forestry in Costa Rica but local taxpayers also lose

owing to the likely higher costs of providing public water services. Both large and small farmers gain from not practising sustainable forestry, but large farmers gain more than small farmers.

However, overall losses are greater than gains, so there is an opportunity for transactions through which the losers, international consumers and local taxpayers pay small and large farmers to practise sustainable forestry. Small farmers would accept a much smaller payment to follow sustainable forestry than large farmers and hence payments for sustainable forestry should be targeted primarily at small farmers.

From a policy perspective, the study resulted in a recommendation to the Government of Costa Rica to establish a system of subsidies for sustainable forest management targeted primarily at small farmers and to promote transactions through which the international gainers would pay the local losers from forest conservation. Since the study, Costa Rica has approved a law creating subsidies for sustainable forest management. Costa Rica has also advanced greatly in exploring other kinds of transactions between international gainers and local losers from forest conservation, namely joint implementation agreements in forestry. Five are currently being implemented and another three are at the proposal stage for a total budget of US$ 28 million.

25. Box III illustrates the relative importance of different types of forest values. While conditions at the Croatian Adriatic coast, from which the example is taken, are quite specific because of the very important tourist industry, it is remarkable how low the timber value is compared with the other values. The comparison also illustrates how site-specific forest values are. The sites in the example are all located along a 200-kilometre-long section of the coastal area of Croatia, yet values vary widely depending on population density (landscape values), the soils (erosion protection benefits) and vegetation type and terrain (hunting benefits).

Box III. Croatia: the value of reforestation

The proposed coastal forest reconstruction and protection project in Croatia envisages, among other activities, replanting 5,800 ha of coastal forests destroyed by war activities.

Quantifying benefits: Separate estimates were made of the expected benefits of reforestation at each of the proposed reforestation sites. The benefits considered include:

(a) Landscape. Evidence shows that forested landscapes significantly increase the attractiveness of resort areas. Tourists are less likely to come to areas without such landscapes, or will come only if prices are significantly lower. Estimates of the landscape benefits provided by forests

were based on surveys of tourist willingness-to-pay for improved landscape; parallel surveys were carried out in Croatia and Italy to estimate willingness-to-pay. Per hectare values of landscape benefits were then computed based on the number of tourists at each site and the size of the visible area, with adjustments for local conditions;

(b) Wood production. The value of future wood production resulting from reforestation was estimated using information on species composition and mean annual increments, with assumptions about the proportion of yield harvested in different time periods;

(c) Hunting. The benefits of improved hunting conditions were quantified using the values derived from the lease of hunting rights to foreign hunters;

(d) Erosion protection. The benefits of erosion protection were estimated from the expected reduction in damage to infrastructure below the proposed reforestation sites. In many cases, however, there was little to be damaged.

Additional benefits that could not be quantified for lack of data include recreational benefits for local populations, harvest of non-timber products, and improvements in microclimatic conditions. The omission of these benefits indicates that the estimates of benefits to reforestation are conservative.

Present value and source of expected benefits from reforestation in Croatia

Country or site	Present value of total benefits (United States dollars per hectare)	Source of benefits (percentage)			
		Visible landscape	Hunting	Wood production	Erosion protection
Jasenje-Bisernjakovica	1 600	53.7	8.6	0.2	37.5
Novigrad	2 700	88.5	10.7	0.8	
Trogir	2 500	66.5	5.6	3.3	24.6
Slano	2 700	97.7	2.0	0.4	
Brsecine	2 600	97.5	2.0	0.5	
Petrinj	2 600	97.5	2.2	0.4	
Srdj	7 800	96.4	3.4	0.2	

Note: Present value of benefits has been discounted at 10 per cent.

Results. The table shows the results of the analysis for several of the proposed sites, including the present value of total economic benefits expected at those sites, and the distribution of benefits by source. Two points stand out clearly:

(a) Wood production is a minor part of total benefits. This reflects partly the relatively low productivity of the area, and partly the long time period before benefits are received. Slightly higher wood production benefits could have been obtained if reforestation plans had been optimized for that purpose, but they would still have constituted only a small fraction of total benefits. Landscape benefits are by far the most important single benefit. At sites with large tourist populations, landscape benefits alone justify reforestation. At sites where the forest is not visible to tourists, however, landscape benefits are very low. Erosion protection and hunting benefits are also significant at several sites;

(b) Both the magnitude and the distribution of benefits vary substantially from site to site, according to the specific conditions encountered at each. An analysis based on average conditions would have been very misleading.

2. Participation and forest values

26. As with any economic asset, the value of forest resources depends on which segments of society have access to and use of them, and the purposes to which such groups put those resources. In the case of forestry, the common practice of concessioning large areas to industrial and commercial entities primarily or solely interested in the commercially utilizable wood output from the forest has implications for the value of the forest. It is frequently the case that such concessioning precludes the use of the forest by people who may have been making traditional extractions from it for generations, or even centuries: examples of eviction of such traditional forest dwellers from large-scale production sites are common.

27. In such cases, the flow of non-timber values from the forest is effectively reduced to zero - a factor that is almost never taken into account when evaluating forest operation proposals. Moreover, the nature of operations carried out on forests by large commercial concerns is frequently not controlled with respect to maximizing the recovery of non-wood and other products that may have considerable value to traditional forest-dwelling and adjacent communities, once operations have ceased. This, combined with the greater access to the area afforded by road and bridge work, done for purposes of timber extraction, may encourage the entry into the area of non-traditional or non-local encroachers - whose primary interest will be not regeneration of forest values, but conversion of the land to other purposes - rather than the re-entry of the original occupants who may be able to make use of non-timber assets.

28. In the interests of balance, it should be pointed out here that attempts to exclude local populations from forests for purposes of conservation can have equally adverse effects. In many cases, effective exclusion is impossible, so encroachment and degradation continue.

29. As has been demonstrated in the case of Indonesia (see box I), the inclusion of non-timber forest product extraction can alter the economics of

forest use, adding value early in the regeneration stream, and thus rendering sustainable options more attractive than they would be in the case where no such extraction of these products is allowed. Moreover, the involvement of the local inhabitants in the management and use of the forest in a meaningful way reduces the costs of protecting regenerating areas, since these people will have an interest in seeing to it that such regeneration is successful and protected. The result of increasing the flow of benefits from the forests, and reducing the costs of protecting them, will be an increase in the total realized value of the resource.

30. Even in cases where local populations in forest areas are not heavily involved in extraction of non-timber forest products, there is a good case to be made for involving them directly in management of the forest, and ensuring that they receive some reward for participation in sustainable management. Otherwise, it is likely they will take advantage of the greater access afforded to forested areas to encroach upon such areas and convert them to other uses - if no financially viable alternative has been offered them. This will happen even where shifting agriculture is an arduous, risky and unsustainable land use. In such cases, the nexus between policies and practices that encourage an exploitive and rent-seeking approach by concession holders and those that exclude other groups of society from participation in forest management becomes particularly destructive.

31. Similar reasoning can be applied to support the involvement of local government agencies in forest management decisions and proceeds: typically, such entities receive little or no proceeds from forest utilization, and even where they do, the terms of such revenue-sharing do not involve any obligation on the part of the local government to assist in protecting regenerating forest from subsequent conversion. In cases such as that of Indonesia cited in box I above, the exclusion of interest groups that are capable of influencing forest cover from any share in the proceeds of traditional and/or commercial extraction will work against the sustainability of the resource, and so will lower its value to the nation.

B. Global level

1. Value of biodiversity

32. There are large uncertainties involved in trying to value biodiversity. Instead of investing heavily in determining the value and requirements for biodiversity conservation, it would probably be more efficient to use such funds to develop principles for selecting areas to be protected and bringing these under effective management. Cost-efficiency should be the criteria when judging which method (in situ, ex situ or that of artificial gene banks) is the most suitable in each case. One way of reducing the cost of preserving biodiversity is to adapt forest management and harvesting techniques so that damages to biodiversity are minimized in commercially managed forests.

33. In the end, biodiversity will not have any value unless there is somebody (nationally or internationally) capable and willing to pay for it. The problem is that normally people living in areas with high potential biodiversity values

are poorer and have less or no paying capacity compared with people in industrialized countries, where the value of biodiversity is often recognized, for example, as raw material for the pharmaceutical industry, or in terms of recreation for visitors. There are, however, some studies that have shown that poor people living in or close to forests place larger values on biodiversity than the urban population with higher income levels (and corresponding ability to pay) in the same country.

34. There is an important need to bridge the gap between the international perception of the value of biodiversity and the need to protect it in situ, and the much different national view of the actual benefits that can be captured from biodiversity conservation and the opportunity costs of forgoing other development options. Normally this can only be done either by government fiat regulating and setting aside protected areas, or via international transfers to guarantee and pay for this protection. Left to normal market forces, there will be an insufficient level of protection given to important biologically rich areas. Often this is especially true precisely in those poorer countries that are particularly rich in biological diversity. Markets will fail to provide what is clearly seen as an international need to protect biodiversity because of the inability to capture those benefits (and pay the associated direct and indirect costs of protection) at the national level. In such situations international transfers, via the Global Environment Facility (GEF), through non-governmental organizations, or via bilaterals, are needed to ensure that sufficient areas are protected. It is of interest that actual payments by pharmaceutical companies to protect biodiversity have been very small (a few tens of millions of dollars), especially when compared with the billions spent on recreational uses of biodiversity-rich protected areas.

35. GEF-type funding is important but still modest compared with the market value of the wood being harvested: for example, from 1988 to 1995, World Bank lending for biodiversity components topped $500 million with an additional $237 million coming from GEF and associated co-financing. When counterpart funds and other donor contributions are included, the total World Bank-administered biodiversity portfolio is over $1.26 billion. In contrast, the value of the global wood harvest for the corresponding period is of the order of 300 times that amount. The challenge is to work with the wood-processing industry to both minimize negative impacts on biodiversity and secure additional resources for biodiversity protection.

2. Value of carbon sequestration in the context of climate change

36. Another "international good" produced by forests is the sequestration of carbon and its beneficial effects on potential global climate change. Just as with biodiversity conservation, the perception is that the direct benefits of carbon sequestration at the national level are small when compared with the real costs of protecting this "carbon sink". The result is that there is little or no incentive for nations to provide carbon sequestration services from their forests, especially for the poorest countries where the alternative uses of forests for timber production or as agricultural lands promise immediate, significant national-level economic benefits.

37. There are three situations where nations will have an incentive to protect forested areas so as to provide carbon sequestration benefits:

(a) In some countries (for example, Canada) there is a strongly held view that countries should sequester carbon as part of a national responsibility towards the world community. At the extreme, this would imply taxing those who harvest trees and release carbon. Not surprisingly, this is a minority view and, if it occurs at all, will likely be found in very-high-income countries;

(b) The existence of binding national and international covenants to reduce carbon emissions over time can also provide the necessary incentive to sequester carbon. Under this condition, a country will examine various options to meet this commitment, and carbon sequestration within the nation is one such option, along with mechanical carbon removal and decrease in carbon dioxide emissions. If the least-cost alternative is to sequester carbon in another location, then the third situation arises;

(c) International transfers may be made whereby one country pays another to sequester carbon via forest protection or reforestation. This option means that the country "selling" carbon sequestration benefits is being compensated for the loss of income from alternative uses of the land, and the country paying for these benefits sees such payment as a lower-cost alternative. There is also the question of moral hazard, which arises when a country threatens to destroy a forest in the hope of receiving some sort of reward for not doing so. The only obvious solution is to ensure that transfers are made solely on the basis of net additions to carbon stocks, or some similar criterion.

38. Although the international market for carbon sequestration is in its infancy, some interesting efforts are being made to develop this market. For example, the Fundación de la Cordillera Volcánica Central (FUNDECOR) in Costa Rica is developing a programme whereby it will guarantee given levels of carbon sequestration through both forest protection and reforestation. The "rights" to the carbon so protected will then be sold on the international market, just as a company sells shares in a firm. The buyer (not infrequently a Northern power utility) will then be purchasing a certain amount of carbon sequestration, produced by FUNDECOR as an agency that creates and maintains a certain quantity of carbon storage. Note that this approach develops a market for carbon sequestration that can be bought and sold on the international market. It should also be pointed out that since carbon sequestration benefits are truly global, and are not dependent on where the carbon is sequestered, the market price for these carbon rights will be set by the lowest-cost providers of the service. Obviously, the growth of this market will require substantial monitoring and supervision, and will depend heavily on the confidence of the market in the management and compliance of the supplier firms with their stated carbon sequestration numbers. Nevertheless, this is an important evolving market and an opportunity for creating international financial transfers to support carbon sequestration services by many countries with extensive areas of forests.

II. VALUING SUSTAINABILITY

39. A fundamental problem connected with encouraging improved forest management is the lack of recognition by the market and national planners of the true values of the various services provided by a forest, and the inability to "capture" part of the value for those benefits or at least receive credit in the market-place for protecting these benefits. Several recent developments offer the promise of improving the incentive for sustainability.

40. Certification of forest products is an important new approach to creating a market for sustainably produced timber products. Certification would help ensure national and international markets for sustainably produced timber, and can help firms recover some of the additional costs associated with such practices. Similarly, the evolution of natural resource accounting is a way to highlight the important role of forests in national economic well-being, and clearly indicate that unsustainable use of forests implies a direct cost to national economic growth.

A. Certification of forest management and forest products

41. The trade instrument is intrinsically a powerful one for bringing countries with large forest holdings to the point of recognizing the value of those holdings, but it is potentially double-edged, and therefore needs to be applied with great caution. If a given forest supplier country has its access to foreign markets for logs and/or forest products significantly reduced because those products become the subject of consumer resistance, owing to their being in some way labelled as "unsustainably produced", then the result may be that the supplier country reduces output, increases monitoring and surveillance of forest operations, and in other ways pursues sustainability more vigorously. However, there is also the possibility that the supplier country will be driven to dump larger volumes on markets where labelling and sustainability are not an issue (thus lowering the price of the products and by extension, of the forest resource) or, alternatively, to simply opt out of forest production to some extent, thus exposing the forest resource to a higher rate of conversion to other uses - presumably the reverse of the intention of the labelling exercise. (The issue of certification and labelling of forest products is one of the main subjects of programme element IV, and will therefore not be further dealt with in this report.)

B. Natural resource accounts

42. The traditional way in which Governments measure their economic "health" is through the use of various macroeconomic indicators. An important one is the gross domestic product (GDP) of a country and its rate of growth over time. The System of National Accounts (SNA) is a well-established approach to measuring the flows of goods and services through an economy and calculating GDP figures. Forests, however, only appear in the traditional SNA when forest products are extracted and sold. There is no accounting for the standing stock of the forest and its change over time. Since the sustainable manner of forests management can be such that the "stock" of forests may not change from one generation to

another, while a constant flow of valuable outputs is extracted, a new approach, natural resource accounting (NRA), has been devised to explicitly measure and track the changes in stocks as well as flows of important natural and environmental resources. Similarly, the establishment of forest plantations are also captured in NRA as an increase of the forestry stock.

43. For the forestry sector, the use of NRA - or more specifically national Forest Resources Accounts (NFRAs) - has the potential to highlight not only the important contribution of forest outputs to national economic growth (marketed outputs are already captured in the SNA), but also changes in the forestry stock over time. Clearly a rapid-growth policy based on cutting down a nation's forests and not replanting is non-sustainable in the long run. This unsustainable development pattern would not be captured in the short run by the traditional SNA but would be clearly reflected in natural resource accounts. Early NRA efforts in Indonesia and Costa Rica highlighted the unsustainable pattern of forest use and its contribution to measured growth.

44. As the value of other important services from forests become acknowledged, the use of NRA can also track some of these dimensions. In short, the use of NRA is one approach to allowing decision makers to more fully understand not only the benefits from immediate direct use of forest resources, but also the longer-term picture of the state of a nation's forest over time. A rational decision maker may still decide to deplete certain forest resources, but the costs of doing this in terms of various forest benefits will have become much clearer.

III. CONCLUSIONS AND PROPOSALS FOR ACTION

45. This report has taken as its point of entry into the subject of forest valuation the fact that political realities have a large impact on the forest economy: rent-seeking behaviour is not simply a factor that is present in the sector, but unfortunately a basic characteristic of it in some countries. At the national level, what actually happens in naturally forested areas - particularly in forest-rich countries - is very much a result of rent-seeking behaviour by powerful, but narrow, vested interests. This creates a situation where sustainable forest management, while by no means uneconomic from the national point of view, is rarely achieved in practice in many developing countries, owing to the undervaluation of the basic raw material from the forest (logs), and the exclusion of other forest products and benefits in the calculus of forest-sector decision makers.

46. This report goes on to argue that from the global perspective the losses caused by lack of sustainable management of large natural forests are even higher than those accruing at the national level, given the concerns surrounding biodiversity destruction, and greenhouse gas emissions. While the international community registers a high level of concern about these matters, there are currently inadequate transfers of funds from the global community as a whole to developing countries to induce genuinely sustainable behaviour in forest management.

47. Undervaluing forest multiple benefits is one of the factors that have led to reduced investments in forestry, especially in the public sector where most of the bilateral and international development agencies are active. Unless techniques and studies aimed at estimating environmental non-market values acceptable to economists and environmentalists are developed and the corresponding policies and institutional reforms are achieved, underinvestment is likely to continue. This will have a particularly adverse impact in those rural areas where forests do and should dominate; investments in forest regeneration will help to guarantee a sustainable source of employment for people living in these areas. Shadow-pricing, which is supposed to cover this aspect of the investment analysis, is often used in a very superficial way and does not capture the specific implications of a "without investment" situation.

48. In many countries where sustainable management of forests has a long tradition, the cost of reforestation is regarded as part of the harvesting cost, that is to say, there is a commitment to restoring and maintaining the resource. Any decision to harvest would take into consideration the cost of restoring the forest resource. If this principle is used, under the condition that proper land-use planning has determined the area suitable for forest, deforestation and degradation of forests are likely to be reduced.

49. In short, significant progress in reducing forest destruction will only come when nations that possess forest resources recognize that sustainable use of the resource is in their own interest. The international community would be well advised to identify very carefully those countries that seem genuinely amenable to this idea, and to direct resources, trade and other support to such countries.

50. In addition, there is need for increased awareness of the costs of inaction, especially in cases where there is the possibility of identifying and even measuring benefits, but no adequate existing mechanism to capture them, for example, the value of carbon sequestration.

A. National level

51. Economic rent collection. The fundamental decision for countries wishing to pursue sustainability principles is that involving economic rent collection. Unless appropriate levels of rent for use of the forest resources are collected, production patterns will tend to be unsustainable and other non-timber benefits will be lost (this was also one of the conclusions of the Denmark-South Africa-United Nations Development Programme (UNDP)-sponsored international workshop on financial mechanisms). The strong influence of large-scale commercial logging and processing interests that are created under these circumstances will continue to crowd out other potential (or traditional) users of other products the forest can supply, thus further reducing the perceived value of the forest.

Proposals for action

Governments in control of large forest resources should collect appropriate rent for their use. In cases where the Government, through a forest service, is an operator, the task is to increase wood prices by opening

markets. Pragmatic solutions for introducing royalty or wood price increases in stages, and even the use of subsidies to affected industries, might be justified; but these need to be applied in a strictly limited time-frame, and in a fully transparent manner.

- Governments will need to invest more money to ensure that the terms and conditions under which the forest resource is made available are adhered to. This will be the case especially where rising royalties increase the temptation to remove timber illegally, or high-grade the forest and reduce utilization standards. Where necessary, high performance bonds (to ensure that the costs of non-compliance are high), coupled with strong incentive measures such as lengthening the term of licenses over given areas and allowing firms to transfer licences, should be applied, so as to ensure that a forest concession in good condition always has positive present value to the concessionaire.

52. Participation. It is widely recognized that participation in the management of, and proceeds from, the forest by all affected groups is necessary in order to realize the full value of the resource, to maximize the chances that it will be utilized in a sustainable fashion and, where appropriate, to achieve certain social goals.

Proposals for action

- Governments should begin to apply participatory forest management mechanisms at significant field scale. There are many options, ranging from direct titling of traditional forest dwellers/users to specific areas, to leasing, forest stewardship, and community concessioning arrangements, by which the access to and rights of use of forests can be broadened, without necessarily abandoning any means of retaining control over the sustainability objective.

- Not all approaches can or should be implemented by fiat from the central government. Large-scale concessionaires can be given a strong incentive to involve local communities in forest operations, through being offered longer and more secure tenure over the resource themselves on evidence of success in this respect, or the inclusion of certain standards of participation in their operations as part of performance bonding (please also refer to the report of the Secretary-General to the Panel at its third session on programme element I.1). Local governments, which are potentially important influences on the behaviour of local communities, can be induced to involve those communities in forest management (or off-forest alternatives) by receiving a larger share of revenues from forest activities than is typically the case, but with those receipts conditioned by successful development of participation alternatives.

- Governments should ensure that poverty objectives are dealt with at least as effectively in the forestry sector as elsewhere. Where local dwellers living in or near forests are largely poor - as is frequently the case where natural forest areas are concerned - then approaches that effectively involve significant numbers of those people will be acceptable. In cases where surrounding populations are more varied in income distribution - as

is often the case around agricultural and agroforestry development sites - then more careful targeting of low-income groups will be required if poverty alleviation is to be a major factor in investments.

53. Natural resource accounting (NRA). A new approach, NRA, has the potential to highlight the real national economic costs of unsustainable patterns of forest use. The results of NRA will inform Governments, the international development assistance community, and the private sector, and should improve decision-making in relation to the forestry sector (some aspects of this issue have been included in the report of the Secretary-General to the Panel at its third session on programme element III.2 (E/CN.17/IPF/1996/21)).

Proposals for action

- Governments should be encouraged to establish indicators and accounting systems to monitor and evaluate changes in the stocks, as well as the flows, of national forest resources.

- International development assistance agencies and other international interest groups should utilize the results of such accounting when planning and prioritizing their own interventions in countries with important forest resources.

B. Global level

54. Biodiversity conservation. In many countries, there is a gap between the apparently high level of international concern for biodiversity conservation and the level of funding available to forest resource-owning countries to protect biodiversity. In some situations, national benefits are sufficiently large to generate the resources needed for conservation. In other situations, transfer of funds from the international community to those countries where biodiversity assets are located will be an important element in obtaining better protection of these resources.

Proposals for action

- Where significant use of biodiversity exists (for (eco)tourism, pharmaceuticals, recreation), either from national or international visitors, efforts are needed to increase "user fees" and income generation to support biodiversity conservation.

- In many situations, owing to budget constraints and low levels of direct use of biodiversity, national Governments may not be able to justify supporting biodiversity conservation adequately. In such cases further international transfers, such as from GEF, non-governmental organizations and bilateral agencies, are required.

- At present, there are few mechanisms whereby consumers of forest products can opt to contribute directly to biodiversity protection. A system of voluntary levies, attached to forest products, collected through suppliers and retailers willing to participate and administered through some credible international agency, could be considered a means of raising consumer

awareness and contributions to the global problem of biodiversity protection in forest areas.

55. Carbon sequestration. Sequestration of carbon in forests as a means of offsetting emissions of greenhouse gases is now generally regarded as a viable approach. The challenge is to implement an effective market approach so as to achieve this.

Proposals for action

- The role of developed-country Governments is crucial, not in making direct contributions to carbon offsetting investments, but in strengthening compliance with existing international agreements on national carbon emission targets, and ensuring that the private sector is allowed enough flexibility to determine the most cost-efficient means of compliance.

- Providing information to potential investors in carbon-offsets will help to develop the international market for carbon sequestration.

- Compliance monitoring is required to develop an efficient and credible international market in carbon-offsets. To be effective, it is essential that application of "carbon charges" be made to all substitutes so that timber certification will not have the perverse effect of driving consumption away from timber to potentially more environmentally damaging alternatives.

Notes

1/ Official Records of the Economic and Social Council, 1995, Supplement No. 12 (E/1995/32), chap. I, sect. D, annex I, sect III.

2/ The subject of demonstrating and measuring environmental and social benefits and of how to capture these benefits was the main theme of the International Symposium on the Non-Market Benefits of Forestry, held in Edinburgh, United Kingdom of Great Britain and Northern Ireland, 24-28 June 1996, organized by the British Forestry Commission as a contribution to the international dialogue on the sustainable management of forests.

Annex

RECENT WORK ON VALUING FOREST BENEFITS

A number of recent works address the issue of valuating the multiple benefits of forests. Some are general overviews while others are site-specific case-studies. A very partial listing from this literature includes the following:

Chomitz, K., and K. Kumari (1996). The Domestic Benefits of Tropical Forests: A Critical Review Emphasizing Hydrological Functions. World Bank Policy Research Working Paper No. 1601. Washington, D.C.: World Bank (May).

Freeman, A. M. (1994). The Measurement of Environmental and Resource Values: Theories and Methods. Washington, D.C.: Resources for the Future.

Gregersen, H. M., and others (1995). Valuing Forests: Context, Issues, and Guidelines. FAO Forestry Paper, No. 127. Rome: FAO.

Grimes, A., and others (1994). Valuing the rain forest: the economic value of non-timber forest products in Ecuador. Ambio, vol. 23, No. 7 (November).

Kramer, R., R. Healy and R. Mendelsohn (1992). Forest valuation. In Managing the World's Forests: Looking for Balance Between Conservation and Development, N. Sharma, ed. Iowa: Kendall/Hunt.

Lampietti, J., and J. Dixon (1995). To See the Forest for the Trees: A Guide to Non-Timber Forest Benefits. Environmental Economics Series Paper, No. 13. Washington, D.C.: World Bank (July).

Mitchell, R., and R. Carson (1989). Using Surveys to Value Public Goods: the Contingent Valuation Method. Washington, D.C.: Resources for the Future.

Wibe, S. (1995). Non Wood Benefits in Forestry: A Survey of Valuation Studies. Economic Commission for Europe/Food and Agriculture Organization of the United Nations (ECE/FAO) Timber and Forestry Discussion Papers. New York and Geneva.